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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KIM, CHONG HWA	
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Please find below and/or attached an Office communication concerning this application or proceeding.

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.

EXAMINER

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Commissioner for Patents

In response to the Remand to the Examiner by the Board of Patent Appeals and Interference dated Aug 12, 2003, paper No. 54. The Examiner provides the following:

1) The Declaration filed on Jun 24, 2002 (Paper No. 38) - It has been entered and the IDS filed along therewith has been considered and signed. The appellent argues, in the declaration, that the IDS (Popular Mechanics, "Sludge Pits", Jul 2002) "would dispose of any weight to the Examiner's argument that extended oil changes are viable with other known technology than that of the present claimed invention…as claimed in our claims 51 and 52." In response, as noted by the Examiner on Apr 7, 2003 (paper No. 49), such article "Sludge Pits" does not negate the Examiner's view that there exists a known technology that would extend the life of lubricant oil other than the appellent's invention. The article only discusses an automaker, Toyota, that recommends the customers to change oil more frequently than the original recommendation of 7500 miles. It is puzzling how such article proves that there is no other technology that would increase the life expectancy of lubricant oil. Nevertheless, the Examiner provided in the previous responses that show Fujiyama, JP 02082304 A (as provided with a fully translated version) disclosing a technology that prevents oxidation of stored oil due to oxygen in the air. Moreover, the Examiner provided, in the paper No. 49, a product available in the market that enhences the life of oil. The product claims that the treatment "extends interval between oil changes" as described in the 6th bullet mark. A PTO-892 that includes the citation of such product literature is provided with this letter.

2) A full English language translation of Japanese Patent Document 2-82304.

3) A considered and signed IDS filed Jun 24, 2002 (paper No. 39).

and

4) A PTO-892 citing the SUPERBAT metal treatment additive.

CHONG H. KIM
PRIMARY EXAMINER

Applicant's Copy

PTO 03-2674

Japanese Patent

Document No. 2-82304

OIL TANK FOR THERMOSTAT CONTROL

[Koon Seigyo Yo Yuso]

Shinobu Fujiyama and Sachio Yanagida

UNITED STATES PATENT AND TRADEMARK OFFICE

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Country	:	Japan
Document No.	:	2-82304
Document Type	:	Kokai
Language	:	Japanese
Inventor	:	Shinobu Fujiyama and Sachio Yanagida
Applicant	:	Horiba Mfg. Co., Ltd.
IPC	:	G 05 D 23/00
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Application Date	:	September 20, 1988
Publication Date	:	March 22, 1990
Foreign Language Title	:	Koon Seigyo Yo Yuso
English Title	:	OIL TANK FOR THERMOSTAT CONTROL

Specification

1. Title of the invention

Oil tank for thermostat control

2. Patent Claim

An oil tank for thermostat control with the following characteristics: In an oil tank for thermostat control which is constituted to control and maintain the temperature of an oil stored within the tank at a certain level and which has been obtained by configuring, within the aforementioned tank, a temperature control target hollow space characterized by a state where it is being immersed in the aforementioned stored oil,

A middle lid is configured within the aforementioned tank in such a way that it can be contacted with the entire upper plane of the aforementioned stored oil, whereas at least a portion of said middle lid is constituted as a floatable lid that can be displaced upward and downward in accordance with the positional displacement of the upper plane of the aforementioned stored oil, whereas the space above the aforementioned middle lid is constituted to be purged constantly by an inert gas.

3. Detailed explanation of the invention

[1] Numbers in the margin indicate pagination in the foreign text.

(Industrial application fields)

The present invention concerns an oil tank for thermostat control which is constituted to control and maintain the temperature of an oil stored within the tank at a certain level and which has been obtained by configuring, within the aforementioned tank, a temperature control target hollow space characterized by a state where it is being immersed in the aforementioned stored oil.

(Prior art)

The heating homogeneity of this type of oil tank for thermostat control is generally excellent, and another characteristic lies in the expandability of its homogeneous heating region, and accordingly, it can be used favorably in a case where it is necessary to control the temperature of a temperature control target hollow space over a relatively broad spectrum at various relatively high levels (e.g., approximately 50°C ~ 250°C) in high precision, as in the case of a hollow space that forms a standard black furnace which is used as a device for calibrating an infrared thermometer (radiation thermometer).

The oil tank of the prior art for thermostat control is characterized by the constitution shown in Figure 3.

In other words, (S) is a tank for storing the oil (O) (e.g., cylinder oil), which serves as a thermal medium, up to a certain oil position, and it possesses the upper lid (1), the overflow

opening (a), the overflow tank (b), etc., whereas the space in the upper portion of its interior is opened to the outer atmosphere via the aforementioned overflow opening (a) and overflow tank (b), whereas, for the purpose of maintaining and controlling the temperature of the aforementioned stored oil (O) at a certain level, the heating heater (H), the agitated blade (F), the feedback control oil temperature sensor (TH) for the aforementioned heater (H), etc. are configured within said tank (S), whereas /2
the temperature control target hollow space (K), which is characterized by a state where it is being immersed in the aforementioned stored oil (O), is concomitantly configured.

Incidentally, the volume variation ratio of the aforementioned stored oil (O) in response to a temperature variation is rather high, and, as has been mentioned above, the temperature control range for said stored oil (O) is extremely broad (approximately 50°C ~ 250°C), and the aforementioned overflow opening (a) and overflow tank (b) are configured for absorbing the immense volume increase that accompanies the concomitant temperature gain of said stored oil (O).

(Problems to be solved by the invention)

The oil tank of the prior art for thermostat control characterized by the aforementioned constitution, however, is plagued with various problems, as shown below.

In other words, since the space in the upper portion of the interior of the tank (S) and the overflow tank (b) are opened to the outer atmosphere, the evaporation area of the stored oil (O) is large, and its evaporation volume is extremely large, which is problematic in that the consumption of the stored oil (O) is considerable and that fire hazards due to ignition are imminent; moreover, the stored oil (O) becomes significantly degraded since it becomes oxidized by the oxygen content of the atmosphere, due to which a gelling phenomenon arises at approximately 250°C, accompanied by a rapid viscosity gain, and it becomes difficult to control the temperature homogeneously; the life of the stored oil (O) is therefore extremely short, and the controllable temperature is limited to approximately 250°C, which is problematic in that it is impossible to elevate the temperature of the temperature control target hollow space (K) past this level, and since the oil flowing into the aforementioned overflow tank (b) becomes contacted with the outer wall plane of the tank (S), the temperature of which has become elevated, it is problematic in that a large volume of oil fumes and unpleasant odors become generated and exert adverse effects on the immediate environment.

The present invention attempts to develop and provide an oil tank for thermostat control which is capable of solving all of the aforementioned shortcomings of the prior art.

(Mechanism for solving the problems)

In order to achieve such an objective, the present invention is peculiarly characterized by the adoptions of the following mechanisms with regard to an oil tank for thermostat control characterized by the fundamental constitution mentioned at the onset: A middle lid is configured within the aforementioned tank in such a way that it can be contacted with the entire upper plane of the aforementioned stored oil, whereas at least a portion of said middle lid is constituted as a floatable lid that can be displaced upward and downward in accordance with the positional displacement of the upper plane of the aforementioned stored oil, whereas the space above the aforementioned middle lid is constituted to be purged constantly by an inert gas.

(Functions)

The following functions are imputed to the constitution characterized in the above.

In other words, as will be further clarified by the descriptions of an application example discussed on a later occasion, instead of auxiliarily configuring an overflow opening and an overflow tank for purposes of absorbing an immense volume increase that accompanies the temperature gain of a stored oil within the tank and of providing an open atmosphere-type tank, as in the prior art, the aforementioned oil tank of the present invention for thermostat control is characterized by the configuration, within the tank, of a float-type middle lid which is contacted with the entire upper plane of the stored oil and at

least a portion of which is constituted to be floatable for enabling its upward and downward displacements in accordance with the positional displacement of the upper plane of the stored oil (i.e., volume variation of the stored oil), and since said tank is constituted as a virtually hermetic one, the evaporation area of the stored oil can virtually be reduced to zero, and its evaporation volume can accordingly be limited to the minimum. As a result, the consumption volume of the stored oil can be significantly minimized, and fire hazards due to ignition can be significantly alleviated as well; moreover, the problem of the immediate environmental pollution ascribed to the constitution of the prior art, namely the generations of a large volume of oil fumes and unpleasant odors, can assuredly be prevented, and since the space in the upper portion of the interior of the tank is constituted to be constantly purged with an inert gas and to preclude the contact of the aforementioned stored oil with the atmosphere, which includes oxygen, the contact of the stored oil with the oxygen can virtually be avoided, due to which its oxidative degrading effect becomes inhibited; in a case where silicone oil, the high-temperature performances of which are superior to those of the cylinder oil, is used as the stored oil, furthermore, the likelihood of a cross-linking reaction diminishes, based on which not only an adequate stored oil life but also a long-term homogeneous high-precision temperature control become ensured; in a case where the silicone oil, the high-temperature performances of which, as mentioned earlier, are

rather favorable, is used, furthermore, the heat-resistant temperature of the stored oil can be elevated to 300°C or higher from the threshold of approximately 250°C in the prior art, and accordingly, the upper limit on the controllable temperature can be elevated to approximately 300°C.

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(Application examples)

In the following, a concrete application example of the oil tank of the present invention for thermostat control will be explained with reference to figures (Figures 1 and 2).

In the lengthwise transverse profile view diagram of Figure 1 and frontal view diagram of Figure 2 (diagram which shows a dissected view of the I-I line in Figure 1), (S) is a tank which is designed to store the oil (O) (in this example, silicone oil, which is far more resistant to oxidation than is the cylinder oil used in the prior art, is used), which serves as a thermal medium, up to the vicinity of a certain oil position, whereas the upper lid (1) is configured on its upper opening for providing an overall constitution of a virtually hermetic tank, whereas the heat insulating material (2) is filled into the inner space of its wall characterized by a double-layer structure for providing a heat insulating tank.

The temperature control target hollow space (K), furthermore, is configured within the aforementioned tank (S) in a state where it is being immersed in the aforementioned stored oil (O), and a

pair of heaters (H) and (H) (of the electrothermal type in this example) and a pair of agitation blades (F) and (F) are concomitantly configured for maintaining and controlling the temperature of the aforementioned stored oil (O) at a certain level. Incidentally, (3) in the figure is a window for the aforementioned temperature control target hollow space (K), and infrared rays emitted through this window (3) may, for example, be referenced as the standard temperature from the calibrating standard black body of an infrared thermometer (radiation thermometer). The aforementioned pairs of heaters (H) and (H) and agitation blades (F) and (F), furthermore, are configured at mutually symmetrical positions in relation to the aforementioned temperature control target hollow space (K) for enabling the most homogeneous possible heating and agitation of the stored oil (O), the viscosity of which is relatively high, whereas the aforementioned pair of agitation blades (F) and (F) are constituted to be driven at an identical rotation frequency by the common motor (M) via power transmission mechanisms (e.g., pulleys (4) and (4), etc.).

The middle lid (N), furthermore, is configured within the aforementioned tank (S) while being contacted with the entire upper plane of the aforementioned stored oil (O). Approximately a half of this middle lid (N) is constituted as the fixed lid (N1), which is configured fixedly at a certain height position, whereas its remaining virtual half is constituted as the float-type lid (N2), which, as indicated by the arrow X in Figure 1, can be

displaced upward and downward in accordance with the positional displacement of the upper plane of the stored oil [i.e., volume variation of the stored oil (O)]. Incidentally, the fixed lid (N1) of the aforementioned middle lid (N) is punched through by the respective axle portions of the aforementioned heaters (H) and (H) and agitation blades (F) and (F), and of these, the punch-through holes (5) and (5), which are secured around the respective axle portions of the agitation blades (F) and (F), which are rotated and driven, via sufficient margins, are formed on its punch-through sites. The reason is because it is difficult to constitute an adequate seal mechanism that can tolerate high temperatures over an extended period. Multiple feedback control oil temperature sensors (TH), … for the aforementioned heaters (H) and (H), furthermore, are configured fixedly on the aforementioned middle lid (N) (N1 and N2) while punching through the latter.

The inert gas (G) (gaseous nitrogen in this example), furthermore, is directly blown and introduced into the gasifying agent feeding tube (5) formed on the fixed lid (N1) of the aforementioned middle lid (N) via the purge gas introduction hole (6), which is auxiliarily configured on the aforementioned upper lid (1) (it must, however, be dispensed modestly and moderately), and the inert gas (G) thus introduced is designed, after having spontaneously entrenched itself throughout the space between the aforementioned upper lid (1) and the middle lid (N) (N1 and N2), to become released gradually to the outside via the purge gas exit hole (7), which is auxiliarily configured on the aforementioned

upper lid (1), based on which the space above the aforementioned middle lid (N) (N1 and N2) is constituted to be purged constantly by the inert gas (G). Incidentally, the inert gas (G), which is thus filled into the space above the aforementioned middle lid (N) (N1 and N2), also serves the function of a heat insulating layer, which is advantageous in that it becomes less likely for the aforementioned stored oil (O) to be affected by the outer atmosphere.

Coincidentally, a case where a portion (half) of the middle lid (N) is constituted as the float-type lid (N2) that can be displaced upward and downward in accordance with the positional displacement of the upper plane of the stored oil has been instantiated in the aforementioned application example, although the entire middle lid (N) can also be embodied as a float-type lid by additionally configuring punch-through holes which are secured around the respective axle portions of the heaters (H) and (H) via sufficient margins on its punch-through sites.

(Effects of the invention)

As the foregoing detailed explanations have clearly demonstrated, as far as the oil tank of the present invention for thermostat control is concerned, a middle lid is configured within the aforementioned tank in such a way that it can be contacted with the entire upper plane of an oil stored in said tank, whereas at least a portion of said middle lid is constituted as a floatable lid /4

that can be displaced upward and downward in accordance with the positional displacement of the upper plane of the aforementioned stored oil, whereas the space above the aforementioned middle lid is constituted to be purged constantly by an inert gas, based on which the evaporation area of the stored oil can virtually be reduced to zero, and its evaporation volume can accordingly be limited to the minimum. As a result, the consumption volume of the stored oil can be significantly minimized, and fire hazards due to ignition can be significantly alleviated as well; moreover, the problem of the immediate environmental pollution ascribed to the constitution of the prior art, namely the generations of a large volume of oil fumes and unpleasant odors, can assuredly be prevented, based on which not only an adequate stored oil life but also a long-term homogeneous high-precision temperature control become ensured; in a case where the silicone oil, the high-temperature performances of which are rather favorable, is used, furthermore, the heat-resistant temperature of the stored oil can be elevated to 300°C or higher from the threshold of approximately 250°C in the prior art, and accordingly, the upper limit on the controllable temperature can be elevated to approximately 300°C; thus, various excellent effects are exhibited.

4. <u>Brief explanation of the figures</u>

Figures 1 and 2 show a concrete application example of the oil tank of the present invention for thermostat control, where Figure 1 is a lengthwise transverse profile view diagram, whereas

Figure 2 is a diagram which shows a dissected view of the I-I line in the former.

Moreover, Figure 3, which is provided for explaining the technical background of the present invention and problems of the prior art, is a diagram which shows an approximate lengthwise transverse profile view of an oil tank for thermostat control characterized by a constitution known in the prior art.

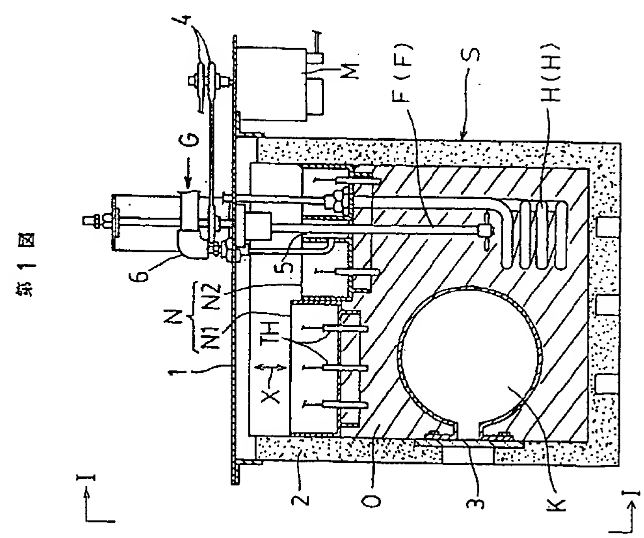
(S): Tank; (O): Oil; (K): Temperature control target hollow space; (N) [or (N2)]: Float-type lid; (G): Inert gas used for purging.

Applicant: Horiba Mfg. Co., Ltd.

Agent: Hideo Fujimoto, patent attorney

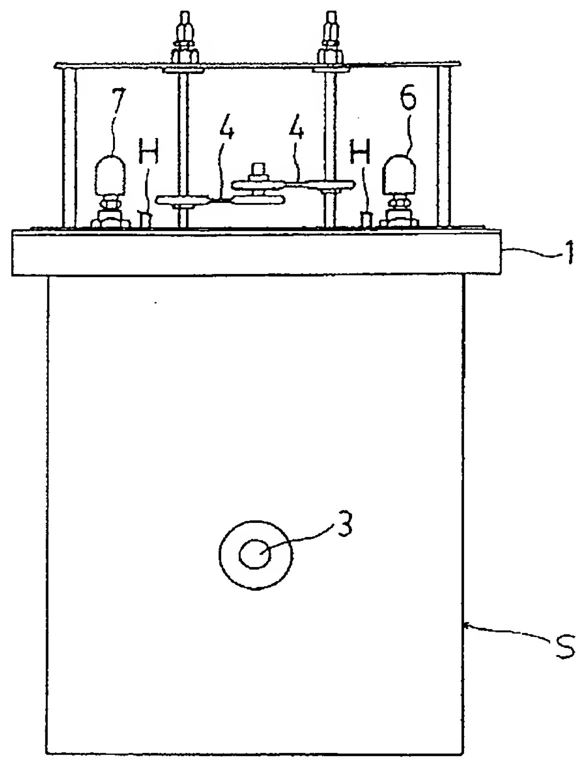
Figure 1

/4



[(S): Tank; (O): Oil; (K): Temperature control target hollow space; (N) [or (N2)]: Float-type lid; (G): Inert gas used for purging]

第2図



第3図